

WHAT IS CLAIMED IS:

1. A method for manufacturing a centrifugal compressor, comprising:
5 casting a compressor wheel from aluminum;
cooling the cast wheel to a temperature less than about -150 degrees Centigrade; and
machining the wheel after said cooling.
2. The method of claim 1 wherein the aluminum is selected from the group
10 including C355, 354, and A354.
3. The method of claim 1 wherein the aluminum includes more than about one-tenth percent by weight of lithium.
- 15 4. The method of claim 1 wherein the aluminum includes more than about one-tenth percent by weight of scandium.
5. The method of claim 1 which further comprises heating the compressor wheel to precipitation harden the aluminum after said cooling.
- 20 6. The method of claim 5 which further comprises heating the cast wheel to a solution heat treatment temperature before said cooling.

7. The method of claim 6 wherein the aluminum is selected from the group including C355, 354, and A354.

8. The method of claim 7 which further comprises hot isostatic processing of the wheel before said cooling.

9. The method of claim 1 which further comprises heating the compressor wheel to precipitation harden the aluminum before said cooling.

10. The method of claim 9 which further comprises heating the cast wheel to a solution heat treatment temperature before said heating.

11. The method of claim 10 wherein the aluminum is selected from the group including C355, 354, and A354.

12. The method of claim 11 which further comprises hot isostatic processing of the wheel before said cooling.

13. The method of claim 1 wherein said cooling includes maintaining a temperature less than about -150 degrees Centigrade for more than about eight hours.

14. The method of claim 13 wherein said cooling is to a temperature less than about -180 degrees Centigrade and greater than about -200 degrees Centigrade.

15. The method of claim 1 which further comprises hot isostatic processing of the wheel before said cooling.

16. The method of claim 1 which further comprises heating the cast wheel to a solution heat treatment temperature before said cooling.

17. The method of claim 1 which further comprises heat treating the cast wheel after said cooling and before said machining

18. The method of claim 17 wherein said heat treating is chosen from the group of annealing at a temperature less than about 145 degrees Centigrade and precipitation hardening at a temperature greater than about 145 degrees Centigrade.

19. The method of claim 17 wherein said cooling is a first cooling of the cast wheel and which further comprises a second cooling of the cast wheel to a temperature less than about -150 degrees Centigrade after said heat treating and before said machining.

20. A method for manufacturing an object, comprising:
casting the object from a metal;

cryogenically processing the cast object to a temperature less than about -150 degrees Centigrade; and

precipitation hardening the cast object after said cryogenically processing.

5 21. The method of claim 20 wherein the metal is a castable aluminum containing more than about four percent by weight of silicon.

22. The method of claim 20 wherein the aluminum is a castable aluminum that includes more than about one-tenth percent by weight of lithium.

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23. The method of claim 20 wherein the aluminum is a castable aluminum that includes more than about one-tenth percent by weight of scandium.

24. The method of claim 20 wherein said precipitation hardening includes heating
15 the cast object to more than about 145 degrees Centigrade.

25. The method of claim 20 wherein said casting is with aluminum material chosen from the group of C355, 354, and A354.

20 26. The method of claim 20 wherein said casting is with material chosen from the group of nickel based alloys.

27. The method of claim 26 wherein said casting is with material chosen from the group of IN 713C, IN 713LC, IN-738, IN-100 and GMR235.

28. The method of claim 20 wherein said casting is with material including
5 GMR235.

29. The method of claim 20 wherein the object is a compressor wheel.

30. The method of claim 20 wherein the object is a turbine wheel.

10 31. A castable composition comprising from about four percent by weight to about twelve percent by weight silicon, more than eighty percent by weight aluminum, and more than about .1 percent and less than about 1 percent chosen from the group including scandium and lithium.

15 32. The composition of claim 31 which includes from about four percent to about eight percent silicon and more than about eighty five percent by weight aluminum.

20 33. The composition of claim 31 which further comprises more than about one percent by weight copper.